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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

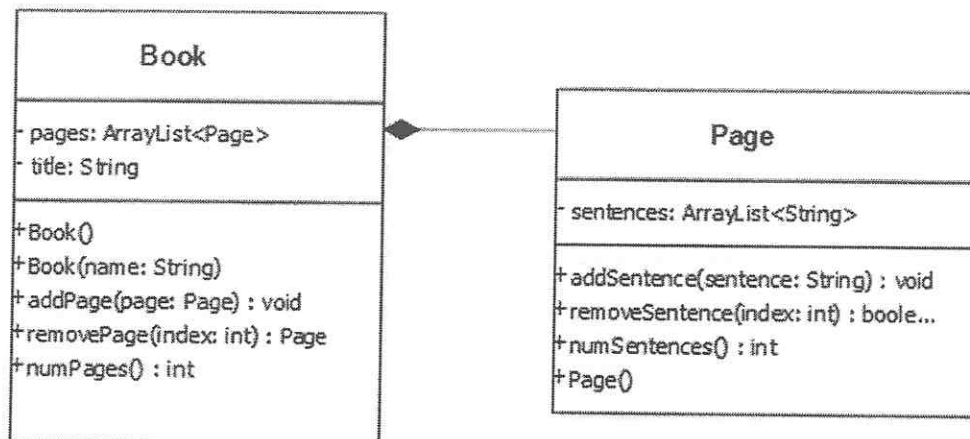
TCP2201 OBJECT ORIENTED ANALYSIS AND DESIGN

(All sections/groups)

7 MARCH 2016
9:00 A.M – 11:00 A.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of seven (6) pages only including the cover page.
2. There are four (4) questions in this paper.
3. Answer **ALL QUESTIONS**.
4. All questions carry equal marks (25 marks) and the distribution of the marks for each sub-question is given.
5. Write your answers in the answer booklet provided.

Question 1

- a) Describe the type of relationship shown between the *Page* and *Book* classes above and how it affects the code in any OO program. [2 marks]
- b) Describe how the UML classes above show the two (2) concepts of encapsulation found in OOP. [4 marks]
- c) Write the Java code for *Page*. You must write the body of the code for each method and initialize the sentences variable correctly. The collection of sentences must be correctly maintained. [9 marks]
- d) Write the Java code for *Book*. If a new book is created without a name, the default constructor should give it the name "Unnamed Book" by calling the other constructor. The other constructor should initialize the pages variable correctly. The collection of pages must be correctly maintained. [10 marks]

Continued...

Question 2

The following scenario is provided for the questions below.

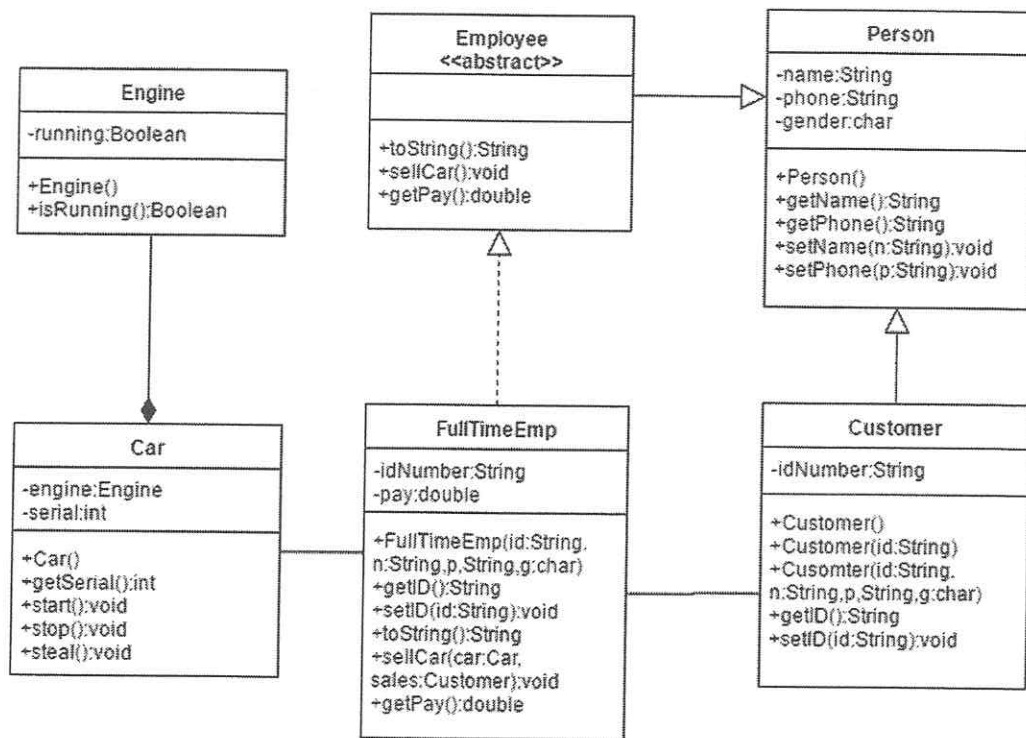
In Manymedia University, to register for a subject a student must first login to the subject registration system. The system will verify the student's login with the database to see if the student's account is valid. If verified, a main menu is shown so the student can request to see the available subjects offered next trimester of which the system will respond and display a list of subjects after retrieval from the database. A student can then choose a subject to register. The system will check with the database to see if there are spaces left available for registration in the chosen subject. If there are spaces, then the student is 'registered' for the subject in their account in the database. If the subject registration is full, then the registration attempt is rejected. Regardless of success or failure, the result of the subject registration is relayed back to the student and displayed to them

- a) What are the three (3) components in a UML sequence diagram and how are they represented?
[4 marks]
- b) Using the scenario above, draw the sequence diagram to show how students register for subjects in *Manymedia University*. [Note: you must make use of specific sequence diagram notation to indicate options]
[10 marks]
- c) Convert the diagram you have drawn in (b) into a collaboration diagram
[6 marks]
- d) One of the five principles of proper object-oriented design is the “*Interface Segregation Principle*”. Explain using a proper example (either with code or UML diagram is acceptable if required) the consequences of applying and ignoring this principle in software design.
[5 marks]

Continued...

Question 3

The UML class diagram below is provided for the questions that follow.



- a) UML components are categorised into structural, behavioural, grouping and annotational 'things'. Describe any two (2) elements that can be found in the structural things category and include an example of a UML diagram that uses that particular element. Include in your answer an example of the notation symbol(s) used for the chosen element.

[8 marks]

- b) What is a realization type of relationship between class?

[2 marks]

- c) Identify which classes in the UML diagram above are in a realization type relationship. Explain why you identified those classes as being in a realization type relationship.

[3 marks]

- d) Convert the UML classes you identified in (c) into Java code. You do not need to write in the method bodies (only the header/prototype) and you do not need to write the code for any other classes used.

[12 marks]

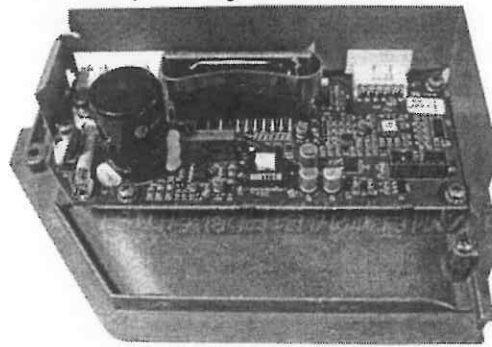
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Question 4

- a) Please state what category these design patterns are in, and describe each one.
- a. Façade
 - b. Iterator
 - c. Observer

[3 marks × 3]

- b) You work for a division that produces a general-purpose controller for machinery that your company manufactures. Because of the large number of possible machines it will control, when instantiating an instance of this controller, there are many possible parameters that could be given. For any particular instance, not all the parameters might be relevant, so you need to accommodate many possible combinations of parameters in your object creation.



What is one design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

WARNING: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked

[8 marks]

- c) Your company has an existing piece of legacy software that controls its assembly line. The front end of the software is, however, very old and not user-friendly. Therefore, your company has purchased a very user-friendly piece of software that uses a standard interface for controlling assembly lines and other equipment, which uses a modern standard API. However, your legacy software does not comply with the modern API, although it has the functionalities needed. You are now faced with getting the legacy software to work with the nice new interface.

Continued...



What design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

Warning: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked.

[8 marks]

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